FROM THE DEPARTMENT OF RADIOTHERAPY (DIRECTOR: M. STRANDQVIST),
UNIVERSITY OF GOTHENBURG, SWEDEN.

CLINICAL APPLICATIONS OF A FIELD POSITIONING AND SIMULATING STAND

by

JOHN JOHANSSON, BENGT ROSENGREN and BENGT TJERNBERG

The field positioning and simulating stand described in a previous paper by JUNG, LARSSON, ROSENGREN et coll. has been applied clinically in connection with the planning of treatment with high-energy radiations as well as for field checking.

Conventional roentgen stands are built to enable projections to be set up that provide the best diagnostic opportunities, while therapeutic stands are constructed with a view to achieving the optimal dosage distribution. The design of the simulator stand makes it possible to reproduce the angles used with therapeutic machines under identical conditions and with the correct focus-skin distance; herein lie the constructive peculiarities of simulators.

In *treatment planning* it is possible to localize, by means of a variety of projections, usually with the central ray horizontal or vertical, and to mark out on the patient's skin the positions of vertebrae and other parts of the skeleton, organs that can be filled with contrast medium, e.g. the bladder (for bladder tumours), and regions that at operation have been marked by indicators, usually in the thorax or abdomen.

Submitted for publication 19 February 1968.

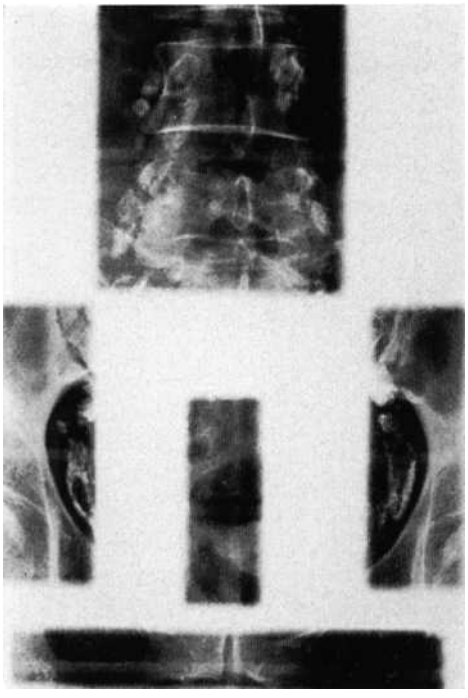
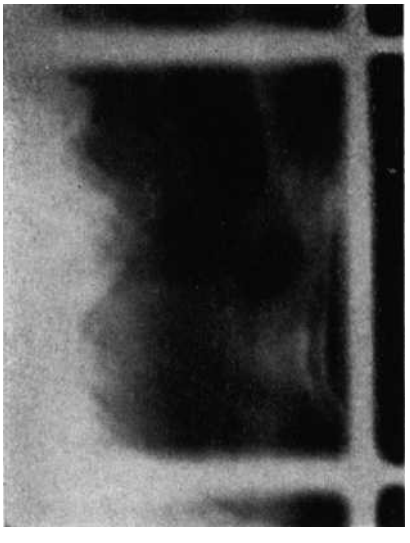
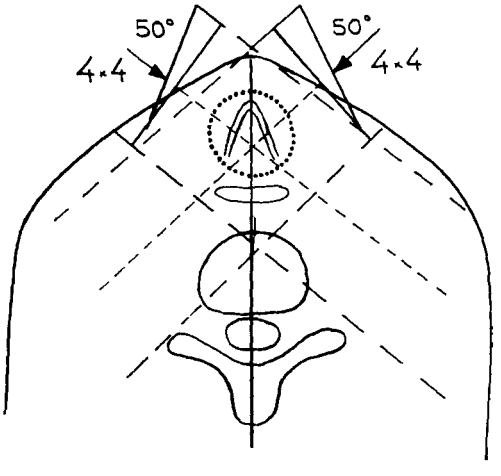


Fig. 1. Narrow beam exposures in one and the same film used for locating carcinoma of the pelvis and for pelvimetry. Contrast medium is seen in the lymph nodes.





Figs 2 and 3. Field check in a case of laryngeal carcinoma (left) and position of fields (right).

Fig. 4

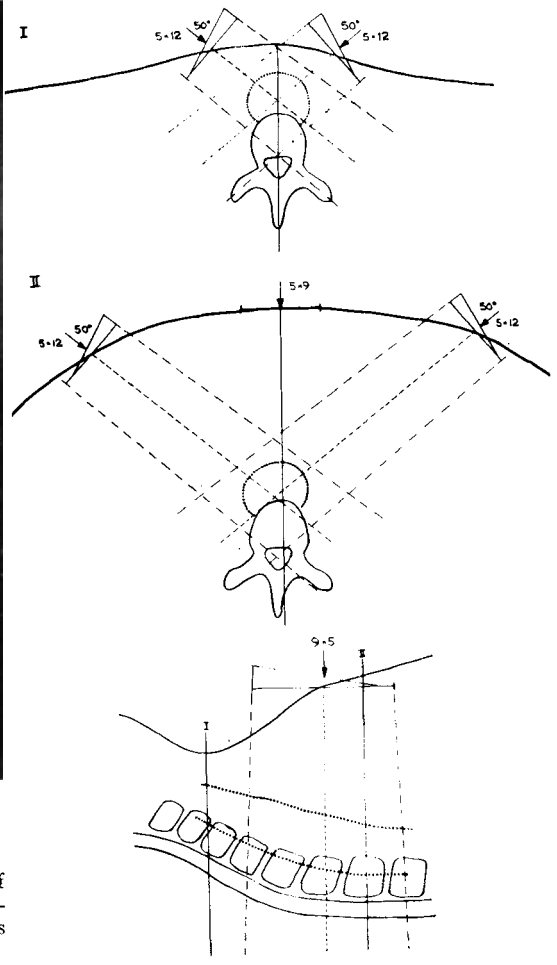


Fig. 5

Figs 4 and 5. Field check in a case of oesophageal carcinoma (left) and position of the fields in different planes (right).

Positioning is possible also if the region to be treated cannot be rendered visible by any of the techniques just mentioned, since in such cases the region to be irradiated can be marked out by guidance of its known relationships to various skeletal landmarks. Certain skeletal details in the pelvis may for example in gynaecologic treatment be employed as markers during the planning stage.

It is most important that organs or parts of organs that should not be exposed to unnecessary radiation can readily be located. A good example is the determina-

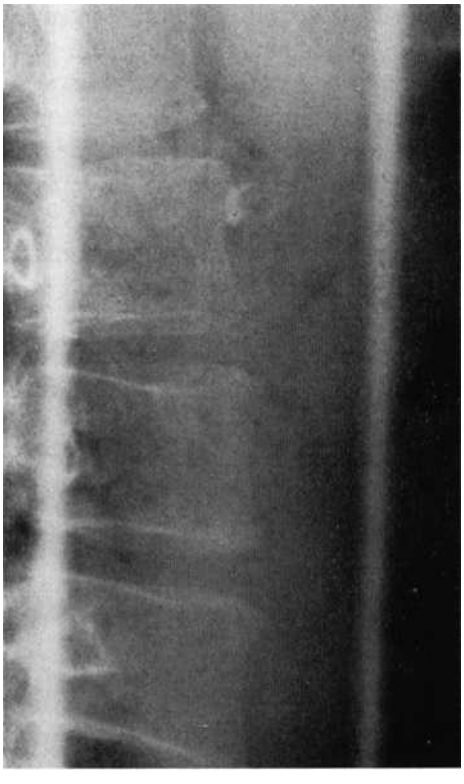


Fig. 6

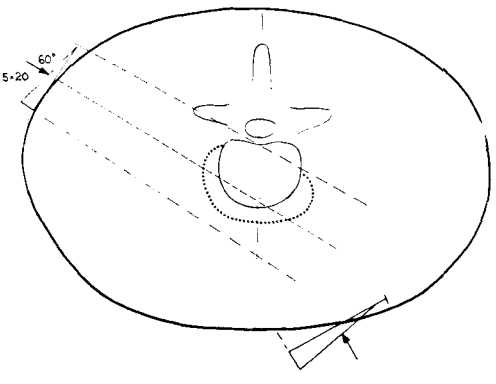


Fig. 7

Figs 6 and 7. Field check in a case of embryonic tumour of the testis undergoing irradiation of the lumbar lymph nodes (left) and position of the field (above).

tion of the position of the spinal cord. When lymph nodes in the hilar regions of the kidneys are to be treated, it is possible to avoid irradiation of the kidneys themselves by localizing them by means of urography performed during the examination with the simulator.

Positioning, so-called indication, is commonly carried out by first obtaining a survey view of the general region and then stepping down to narrow slits so that in principle merely the central ray is used. By moving the patient sideways or vertically in the narrow beam the margins of the region to be irradiated may then be marked out on the patient and the measurements transferred directly to the dosage plan. If a roentgen film is placed under or beside the patient, and several narrow-beam exposures are made on the same film, measurements may be obtained directly from the roentgen image without consideration of enlargement factors. Such a method, used for localizing carcinoma of the pelvis in women, is illustrated in Fig. 1.

Field checks are most important when small fields are employed and accurate positioning is essential, e.g. in cases of laryngeal carcinoma for which the vocal cord region must be in the middle of the region to be irradiated so that irradiation of the spinal cord is avoided. An example of this appears in Figs 2 and 3. Experience has shown that it may be difficult to position fields when the longitudinal axis of the tumour region forms an angle with the horizontal plane, e.g. in oesophageal carcinoma. The pendulum axis as well as the position of the collimator must then be angled. The field positioning and simulator stand makes this comparatively simple; a field check of this type is shown in Figs 4 and 5. It is also difficult to position the region to be treated so that the spinal cord is avoided in irradiation of the lumbar lymph nodes, e.g. in cases of embryonic tumours of the testes. A field check in such a case appears in Figs 6 and 7. Checking is usually made with an image intensifier and then, if desirable, the observations are documented on a roentgen film placed in the cassette holder on the image intensifier.

In conclusion it may be stated that the simulator has been found to be indispensable both for dose planning and field checking.

SUMMARY

The clinical applications of a field positioning and simulating stand are described.

ZUSAMMENFASSUNG

Die praktische Anwendbarkeit eines Bestrahlungssimulators für Feldlokalisierung wird besprochen.

RÉSUMÉ

Les auteurs décrivent les applications cliniques d'un statif de mise en place des champs et de simulation.

REFERENCES

JUNG B., LARSSON B., ROSENGREN B. et coll.: A roentgen stand for field positioning in high-energy radiotherapy. Acta radiol. Ther. Phys. Biol. 7 (1968), 282.